

High Performance Liquid Chromatography No. L212

Application to Food Analysis (No.18) — Analysis of Tea —

Various kinds of substances like caffeine, catechins, and amino acids are contained in the leaves of tea. Depending on the kinds of tea leaves, there is difference as to which of these substances are contained and the content of them also differs due to

the condition of growth, on which lots of reports have so far been made. Introduced here are examples of analyses of 5 substances including caffeine and catechins by HPLC. Also analysis of vitamin C extracted from the tea leaves is introduced here.

■ Analysis of Caffeine and Catechins

10 μ L of standard solutions of caffeine (CAF 200 ppm) and catechins (epigallocatechin ... EGC 850 ppm, catechin ... C200 ppm, epigallocatechin-gallate ... EGCG 300 ppm, epicatechin ... EC 250 ppm, epicatechingallate ... ECG 250 ppm) were injected into the HPLC, of which chromatogram is shown in Fig.1. The analytical conditions are shown in Table 1. Under the same analytical conditions, a sample of commercially available green tea which was stewed in hot water and filtered through a membrane filter was subjected to analysis by HPLC. Fig.2 shows the chromatogram.

Table 1 Analytical Conditions

Instruments	: Shimadzu LC-9A system	[Gradient program]		
Sample	: Fig.1 a standard solution	initial value		
	solvent ; water/methanol	BCONC 7		
	(95/5) 10 μ L injection			
	Fig.2 a green tea sample	time program		
	10 μ L injection	TIME	FUNC	VALUE
Column	: STR ODS-M (4.6mm I.D. \times 15cm L.)	30	BCONC	7
Column Temp.	: 45°C	30.01	BCONC	12
Mobile Phase	: A ; 10mM sodium phosphate buffer	45	BCONC	12
	(pH 2.6)	45.01	BCONC	50
	B ; acetonitrile	50	BCONC	50
Flow Rate	: 1.0 mL/min.	50.01	BCONC	7
Detection	: SPD-6A, 280 nm, 0.64 AUFS	80	STOP	

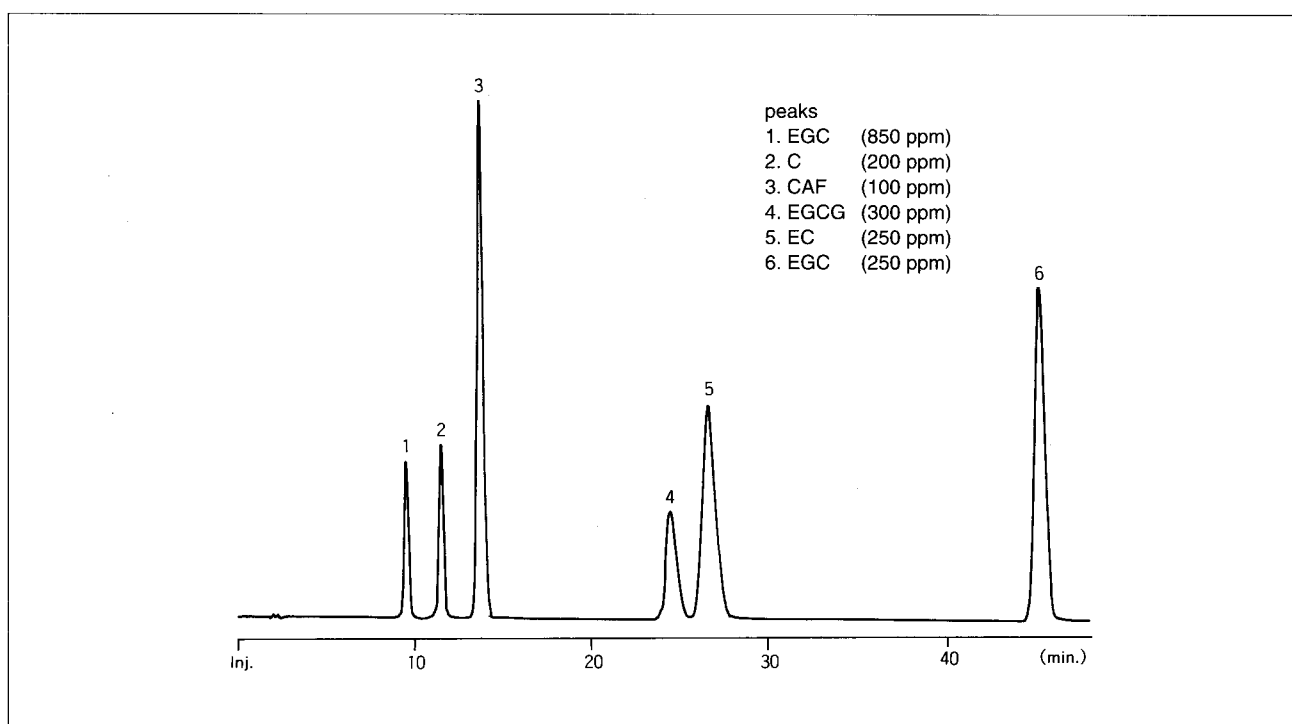


Fig.1 Chromatogram of a Standard Sample

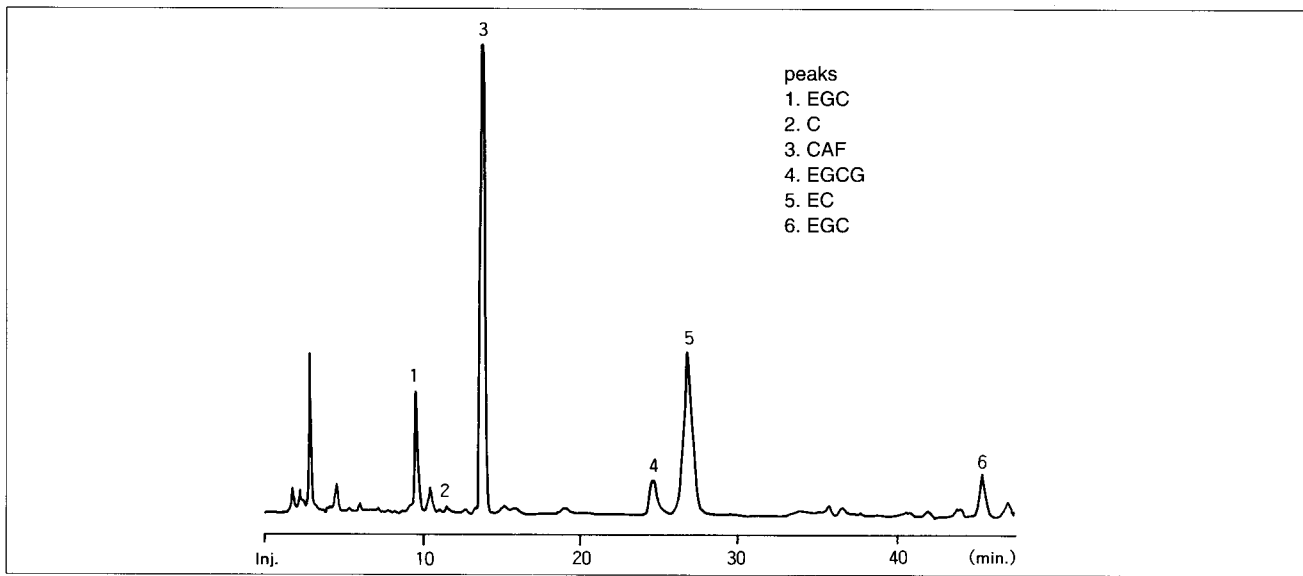


Fig.2 Chromatogram of a Green Tea Sample

■ Analysis of Vitamin C

Fig.4 shows a chromatogram of a sample to which $10 \mu\text{l}$ of a standard solution of vitamin C (50 ppm) was injected. Shown in Fig.5 is a chromatogram of green tea. The pretreatment procedure is shown in Figure 3 and the analytical conditions in Table 2.

1g of green tea
 |
 ← 100mL of 10mM EDTA-2Na
 Stir 20min. at room temperature
 |
 Filter (0.45 μm) ··· Filtrate A
 |
 Prepare Bond Elut C18 precolumn
 |
 Wash with 1mL methanol and 1mL water
 |
 Pass through 1mL of filtrate A
 |
 inject $10 \mu\text{L}$ of eluent

Fig.3 Pretreatment Procedure

Table 2 Analytical Conditions

Instruments	: Shimadzu LC-9A system
Sample	: Fig.4 a standard solution (50 ppm) solvent ; 10mM EDTA-2Na $10 \mu\text{L}$ injection
Column	: Fig.5 a green tea sample Shim-pack SCR-102H (8.0mm I.D. \times 30cm L.)
Column Temp.	: 40°C
Mobile Phase	: 20mM phosphoric acid
Flow Rate	: 1.0 mL/min.
Detection	: SPD-6A, 245nm, 0.16 AUFS

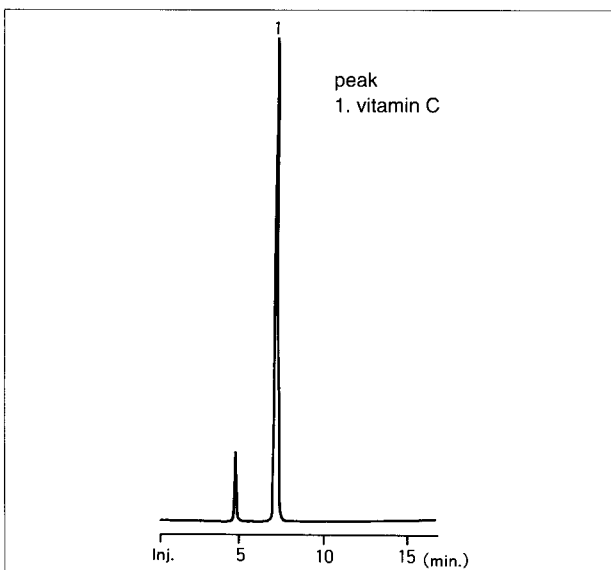


Fig.4 Chromatogram of a Standard Sample

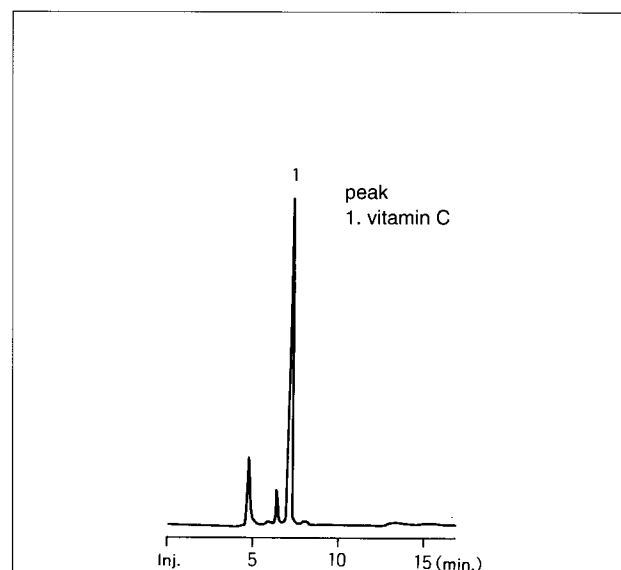


Fig.5 Chromatogram of a Green Tea Sample

 **SHIMADZU**

SHIMADZU CORPORATION, International Marketing Division
 3, Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan Phone: 81(3)3219-5641 Fax: 81(3)3219-5710
 Cable Add.: SHIMADZU TOKYO